



# Numerical analysis of tsunami propagation on wide reef platform

## Takahito Mikami and Tomoya Shibayama

## Introduction

• During the 2009 Samoan Islands Tsunami, the wide coral reef platform in front of the islands affected the approaching tsunami behavior (Mikami et al., 2011).



- After the 2004 Indian Ocean Tsunami, the fact that coral reefs affected tsunami propagation was reported in many
- This research aims to understand the characteristics of a tsunami propagating over a reef platform by using a turbulence model.



**Fig. 1** Map of the surveyed villages in Upole Island, Samoa.

#### Numerical model and results 3

 A Large Eddy Simulation (LES) model was used to simulate wave breaking and energy dissipation.

#### countries.



**Fig. 2** Reported reef effects on previous tsunami events.

\*  $H_h$ : average wave height at breaking point,  $H_p$ : average wave height at breaking end (Iwase et al., 2001)

- If a reef is wide enough, wave is divided into two peaks and then the wave height gradually decreases.
- The energy evaluated by the averaged energy flux is dissipated as the wave approaches the shoreline.





Velocity field around breaking point ( $L_r=750$  cm,  $H_i=7$  cm). Fig. 4



## Conclusion

- The results of numerical simulations by using LES model were shown to reproduce well the results of the field survey in the 2009 Samoan Islands Tsunami.
- The present method may also apply to other countries which have coral reefs and contribute to regional tsunami mitigation strategies.
- It is important to understand what is the phenomenon that people in coastal areas actually experience as well as the height and arrival time of a tsunami.

#### References

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### Contact

Waseda University, Tokyo, Japan

Takahito Mikami : <u>t.mikami@asagi.waseda.jp</u>